

AMENDMENT TO THE CLAIMS

What is claimed is:

1. (Cancelled) A process for forming a bonded part comprising a rubber member and at least one of a first outer member and a second outer member, comprising the steps of:
 - a. placing an uncured elastomer composition comprising at least one elastomer, at least one adhesive adjuvant and at least one curative into a shape-forming mold; and characterized in that the process further comprises the steps of:
 - b. exposing said elastomer composition to a first cure step comprising at least one of a first temperature and a first pressure over a first exposure period sufficient to less than fully cure said elastomer composition;
 - c. placing the so formed less than fully cured elastomer composition in contact with a surface of at least one of said first outer member and said second outer member; and
 - d. exposing said less than fully cured elastomer composition to a second cure step comprising at least one of a second temperature and a second pressure over a second exposure period sufficient to substantially fully cure said elastomer composition.
2. (Cancelled) The process of claim 1 wherein at least one of said first- and said second members is formed of metal, and wherein said adhesive adjuvant is a rubber-to-metal adhesive adjuvant.
3. (Cancelled) The process of claim 1 wherein said less than fully cured elastomer composition is in direct contact with said surface of said outer member.
4. (Cancelled) The process of claim 1 further comprising the step of removing said less than fully cured elastomer composition from said shape-forming mold prior to said second cure step.
5. (Cancelled) The process of claim 2 wherein said at least one rubber-to-metal adhesive adjuvant is one selected from the group consisting of Type I coagent compounds, Type II coagent compounds, tackifiers, and a combination of at least any two of the foregoing.

6. (Cancelled) The process of claim 2 wherein said at least one rubber-to-metal adhesive adjuvant is at least one selected from:
 - a. a metal salt of an alpha-beta unsaturated organic acid,
 - b. a bis-maleimide, and
 - c. a maleated polybutadiene resin.
7. (Cancelled) The process of claim 1 wherein said at least one elastomer is selected from ethylene-alpha-olefin elastomer, ethylene/acrylic elastomer, polychloroprene rubber, acrylonitrile butadiene rubber, hydrogenated acrylonitrile butadiene rubber, styrene-butadiene rubber, alkylated chlorosulfonated polyethylene, epichlorohydrin, polybutadiene rubber, natural rubber, chlorinated polyethylene, brominated polymethylstyrene-butene copolymers, silicone rubber, styrene-butadiene-styrene-block copolymer, styrene-ethylene-butadiene-styrene block copolymer, acrylic rubber, ethylene vinyl acetate elastomer, and a combination of two or more of the foregoing.
8. (Cancelled) The process of claim 1 wherein said bonded part comprises said first outer member and said second outer member, and said less than fully cured elastomer composition is placed between said outer members.
9. (Cancelled) The process of claim 8 further comprising the step of compressing said less than fully cured elastomer composition between said first outer member and said second outer member prior to exposing said less than fully cured elastomer composition to said second cure step, such that said less than fully cured elastomer composition is disposed under compression between said first and second outer members.
10. (Cancelled) The process of claim 8 further comprising the step of placing said uncured elastomer composition in contact with a surface of one of said first outer substrate and said second outer substrate.
11. (Cancelled) The process of claim 1 wherein said bonded part is selected from a torsional vibration damper, a rubber-viscous vibration isolation damper, a vibration isolator, a vibration isolation mount, a vibration damper, a coupling, a rubber roll, a transmission belt and a hose.

12. (Cancelled) A process for forming a torsional vibration damper comprising a cured elastomer composition, a first metal surface and a second metal surface, comprising the steps of:
 - a. placing an uncured elastomer composition comprising at least one elastomer, at least one curative, and at least one rubber-to-metal adhesive adjuvant into a shape-forming mold;
 - b. exposing said uncured elastomer composition to a first pressure and a first applied temperature over a first exposure period sufficient to only partially cure the composition to a state of cure of from about 20% to about 99% as determined in accordance with ASTM D5289;
 - c. disposing said partially cured elastomer composition between said first metal surface and said second metal surface; and
 - d. exposing said partially cured elastomer composition to at least one of a second pressure and a second applied temperature over a second exposure period sufficient to substantially fully cure said elastomer composition.
13. (Cancelled) The process of claim 12 wherein said first pressure, said first applied temperature and said first exposure period are sufficient to cure the composition to a state of cure of from about 50% to about 95% as determined in accordance with ASTM D5289.
14. (Cancelled) The method of claim 12 wherein said first pressure, said first applied temperature and said first exposure period are sufficient to cure the composition to a state of cure in the range of from about 70% to about 90% as determined in accordance with ASTM D5289.
15. (Cancelled) The method of claim 12 further comprising the step of incorporating in said elastomer composition a first curative and a second curative, said first curative exhibiting a first activation temperature and said second curative exhibiting a second activation temperature; and wherein said first applied temperature and time is sufficient to activate said first curative, and said second applied temperature and time is sufficient to activate said second curative.

16. (Cancelled) The method of claim 12 further comprising the step of exerting force onto said subassembly to achieve a compression of said elastomeric composition of up to about 50% prior to said second curing step.
17. (Currently amended) A rubber-to-metal bonded article, comprising at least a first rigid metal member, a second rigid metal member and a cured rubber member disposed press fit between and bonded to said first metal member and said second metal member, wherein:
- a. said rubber member is the reaction product of at least one elastomer, at least one rubber-to-metal adhesive adjuvant and at least one curative;
 - b. ~~said rubber member is formed and arranged to reside between said metal members~~ resides in at least one of a neutral state and a state of compression at a temperature in the range of from about -20°C to about 120°C; and
 - c. said bonding of said rubber member to at least one of said metal members is achieved in the substantial absence of an adhesive layer between said rubber member and said at least one metal member.
18. (Previously presented) The article of claim 17 wherein said bonding of said rubber member to said metal members is achieved in the substantial absence of an adhesive layer between said rubber member and said metal members.
19. (Original) The article of claim 17 wherein said elastomer is one selected from:
- a. ethylene-alpha-olefin elastomer;
 - b. ethylene/acrylic elastomer,
 - c. polychloroprene rubber,
 - d. acrylonitrile butadiene rubber,
 - e. hydrogenated acrylonitrile butadiene rubber,
 - f. styrene-butadiene rubber,
 - g. alkylated chlorosulfonated polyethylene,
 - h. epichlorohydrin,
 - i. polybutadiene rubber,
 - j. natural rubber,
 - k. chlorinated polyethylene,

- l. brominated polymethylstyrene-butene copolymers,
 - m. styrene-butadiene-styrene- block copolymer,
 - n. styrene-ethylene-butadiene-styrene block copolymer,
 - o. acrylic rubber,
 - p. ethylene vinyl acetate elastomer,
 - q. silicone rubber, and
 - r. a combination of any of at least two of the foregoing.
20. (Previously presented) The article of claim 17 wherein said elastomer is selected from ethylene propylene copolymer; ethylene-propylene diene terpolymer; ethylene octene copolymer; ethylene butene copolymer; ethylene octene terpolymer; and ethylene butene terpolymer.
21. (Previously presented) The article of claim 17 selected from a torsional vibration damper, a rubber-viscous vibration isolation damper, a vibration isolator, a vibration isolation mount, a vibration damper, and a coupling.
22. (Original) The article of claim 17 wherein said rubber-to-metal adhesive adjuvant is selected from:
- a. a metal salt of an unsaturated carboxylic acid;
 - b. a maleinized polybutadiene resin;
 - c. a phenylene dimaleimide; and
 - d. a combination of at least two of the foregoing.
23. (Original) The article of claim 17 wherein said at least one curative is selected from:
- a. a free-radical producing agent;
 - b. sulfur; and
 - c. a combination thereof.
24. (Original) The article of claim 17 wherein said elastomer composition is the reaction product of at least two said curatives, each said curative having an activation temperature distinct from the other of said curative.
25. (Previously presented) The article of claim 17 in the form of a torsional vibration damper.

26. (Previously presented) The article of claim 17 wherein said at least one of a neutral state and a state of compression is not the result of a post-assembly metal-forming step.
27. (Currently amended) The article of claim 17 wherein said cured rubber member was substantially is partially cured to a state of cure of from about 20% to about 99% in a shape-forming mold prior to assembly of said article.
28. (Currently amended) The article of claim 27 wherein said cured rubber member is ~~press fit between said metal members~~ substantially fully cured.
29. (Withdrawn – currently amended) An The article of claim 28 wherein said bonding of said rubber member to said metal members is achieved in the substantial absence of an adhesive layer between said rubber member and said metal members comprising a rubber member and two structural members, wherein said rubber member is press fit between said structural members, and wherein said rubber member is bonded to said structural members in the absence of an adhesive layer between said rubber member and said structural members, and wherein said rubber member is in at least one of a neutral state and a state of compression at a temperature in the range of from about -20°C to about 120°C.
30. (Cancelled) The article of claim 29 wherein said structural members comprise one or more materials selected from the group consisting of metals, composites, structural composites, and plastics.
31. (Withdrawn – currently amended) The article of claim 29 wherein said rubber member is in a state of compression at a temperature in the range of from about -20°C to about 120°C comprises the reaction product of at least one elastomer, at least one rubber to metal adhesive adjuvant, and at least one curative.
32. (Withdrawn – currently amended) The article of claim ~~34-17~~ wherein said cured rubber member is partially cured to a state of cure of from about 50% to about 95% in a shape-forming mold prior to assembly of said article elastomer is selected from the group consisting of
- a. ~~ethylene-alpha olefin elastomer;~~
 - b. ~~ethylene/acrylic elastomer;~~

- e. ~~polychloroprene rubber,~~
 - d. ~~acrylonitrile butadiene rubber,~~
 - e. ~~hydrogenated acrylonitrile butadiene rubber,~~
 - f. ~~styrene butadiene rubber,~~
 - g. ~~alkylated chlorosulfonated polyethylene,~~
 - h. ~~epichlorohydrin,~~
 - i. ~~polybutadiene rubber,~~
 - j. ~~natural rubber,~~
 - k. ~~chlorinated polyethylene,~~
 - l. ~~brominated polymethylstyrene-butene copolymers,~~
 - m. ~~styrene butadiene styrene block copolymer,~~
 - n. ~~styrene ethylene butadiene styrene block copolymer,~~
 - o. ~~acrylic rubber,~~
 - p. ~~ethylene vinyl acetate elastomer,~~
 - q. ~~silicone rubber, and~~
 - r. ~~a combination of any of at least two of the foregoing.~~
33. (Withdrawn – currently amended) The article of claim 34-17 wherein said cured rubber member is partially cured to a state of cure of from about 70% to about 90% in a shape-forming mold prior to assembly of said article elastomer is selected from ~~ethylene-propylene copolymer; ethylene-propylene diene terpolymer; ethylene-octene copolymer; ethylene-butene copolymer; ethylene-octene terpolymer; and ethylene-butene terpolymer.~~
34. (Withdrawn) The article of claim 29 selected from a torsional vibration damper, a rubber-viscous vibration isolation damper, a vibration isolator, a vibration isolation mount, a vibration damper, and a coupling.
35. (Withdrawn – currently amended) The article of claim 34-29 wherein said rubber-to-metal adhesive adjuvant is selected from:
- a. a metal salt of an unsaturated carboxylic acid;
 - b. a maleinized polybutadiene resin;
 - c. a phenylene dimaleimide; and
 - d. a combination of at least two of the foregoing.

36. (Withdrawn – currently amended) The article of claim 34 29 wherein said at least one curative is selected from:
- a free-radical producing agent;
 - sulfur; and
 - a combination thereof.
37. (Withdrawn – currently amended) The article of claim 34 29 wherein said elastomer composition is the reaction product of at least two said curatives, each said curative having an activation temperature distinct from the other of said curative.
38. (Withdrawn – currently amended) ~~A torsional vibration damper comprising~~ The article of claim 17 wherein said cured rubber member is an annular rubber member and said two metal members define an annular gap; and wherein the rubber member is press fit into the annular gap; wherein the rubber member is bonded to the two metal members in the absence of an adhesive layer between the rubber member and the two metal members; and wherein the rubber member is the reaction product of a rubber composition comprising an elastomer, a rubber-to-metal adhesive adjuvant, and two curatives, each said curative having an activation temperature distinct from the other of said curative.
39. (Withdrawn – currently amended) The article of claim 38 wherein said cured rubber member is partially cured to a state of cure of from about 20% to about 99% in a shape-forming mold prior to assembly of said article. ~~A torsional vibration damper comprising an annular rubber member sandwiched between two rigid members at least one of which is metal; said rubber member being the reaction product of a rubber composition comprising an elastomer, a rubber-to-metal adhesive adjuvant, and two curatives; each said curative having an activation temperature distinct from the other of said curative.~~
40. (Withdrawn – currently amended) ~~The torsional vibration damper~~ article of claim 39 wherein said cured rubber member is substantially fully cured ~~elastomer is selected from the group consisting of an ethylene-alpha olefin, an ethylene-acrylic, a polyacrylic, an acrylate rubber, ethylene vinylacetate, and a~~

~~combination thereof; and wherein said adhesive adjuvant is selected from the group consisting of a metal salt of an unsaturated carboxylic acid, a maleinized polybutadiene resin, a phenylene dimaleimide, and a combination thereof.~~

41. (Withdrawn – currently amended) The torsional vibration damper article of claim 40 in the form of a torsional vibration damper 39 ~~wherein said curatives are free-radical producing curatives.~~